The Citrus Industry

DAN McCARTY
Prominent Citrus Grower and Businessman of Fort Pierce, Candidate for Governor of Florida

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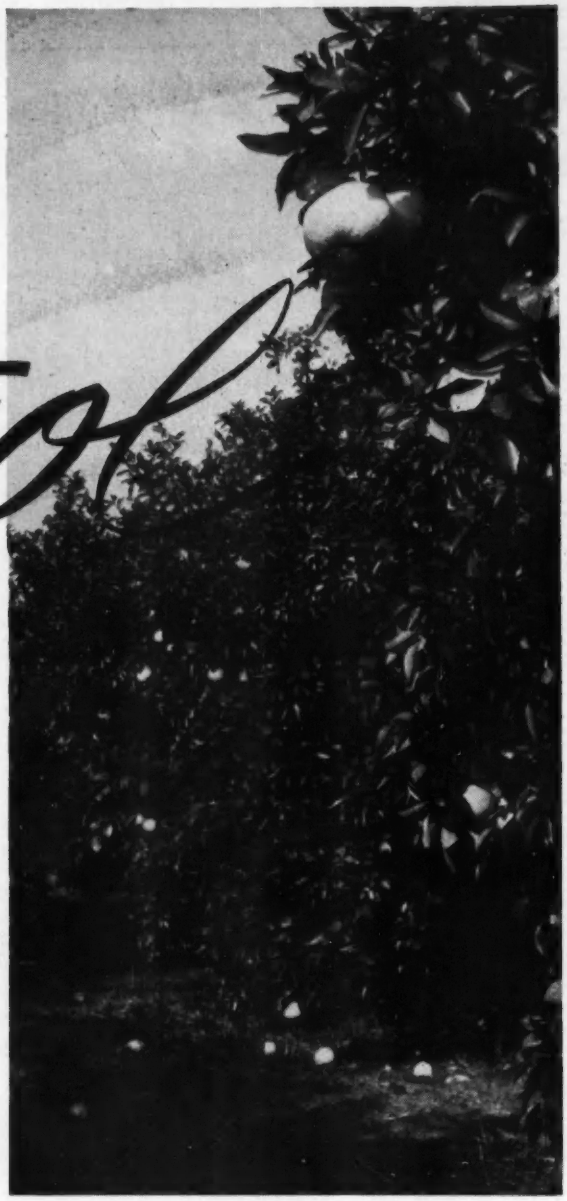

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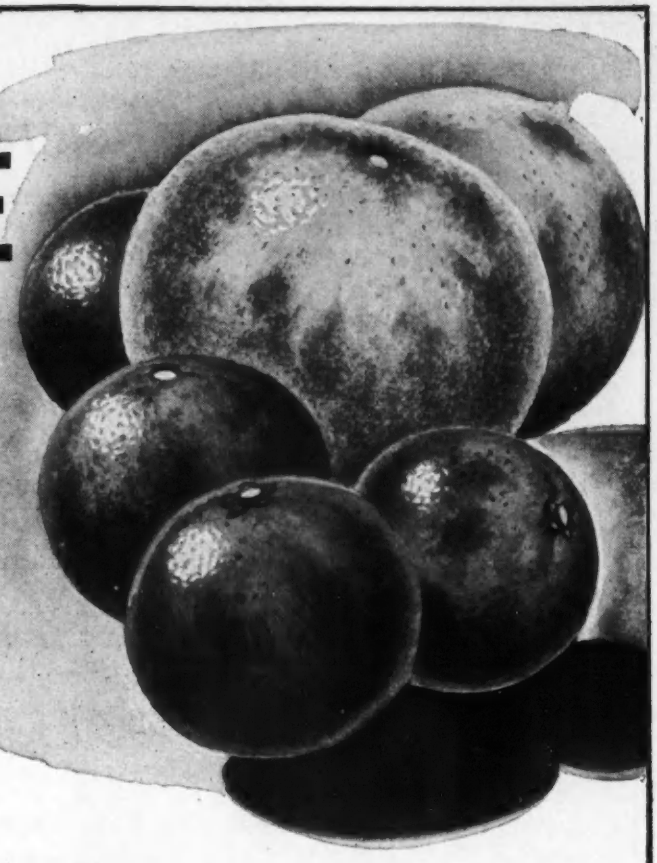

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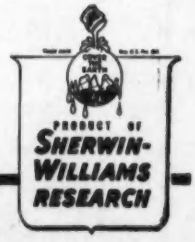

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Timing Of Oil Sprays

As Related To Fruit Quality, Scale Control, Coloring And Tree Condition . . .

JOHN W. SITES /1 AND
W. L. THOMPSON /2

Introduction

During the past eight years a fairly intensive study has been made at the Citrus Experiment Station to determine the importance of the timing of the oil spray in controlling scale insects. The extent to which the timing of this spray affects fruit quality, coloring or "degreening" of the fruit in the packinghouse and tree vigor has also been studied. Phases of this work have been reported previously as separate papers or as parts of other general papers, consequently, this article is a brief presentation of recommendations regarding the use of oil sprays on oranges and grapefruit as related to all the practical aspects involved.

Ever since the adoption of the present nutritional program for citrus the use of oil sprays to control scale insects has become increasingly important. Trees in poor physical condition because of deficiencies are seldom found infested with large scale population (3,4) but most citrus groves in Florida today are free of deficiencies and are in good physical condition, and attendant with this condition is a potentially serious scale control problem. Until some control measure can be found which is less toxic to citrus trees than oil, it is necessary that we know how to apply oil to get the best scale control and at the same time minimize the reduction in internal fruit quality, the amount of poorly colored fruit and the reduced vigor of the trees which may result from its improper use.

At present the consumer, packer and canner are emphasizing the desirability of obtaining better quality fruit. These circumstances all point to the necessity for understanding as fully as possible all of the factors which are known to affect the internal quality of citrus fruits to any degree.

Timing of Oil Sprays As Related to Fruit Quality

In a preliminary report Thompson and Sites (2) pointed out that oil sprays applied after August 1 either delayed or prevented the formation of maximum solids, especially during the early part of the picking season. They recommended that, when possible, oil sprays should be applied in June or July to minimize any effect the spray might have on delaying the formation of maximum solids or in delaying maturity. These general statements still hold true, but as a result of additional work, more specific recommendations can now be made. Oil timing experiments at the Citrus Station were conducted on Hamlin. Pineapple and Valencia oranges and on Excelsior grapefruit. Sampling was started early in the season of each year, beginning in September for Hamlins and continuing usually into April or later for Valencias. Excelsior grapefruit was sampled from September until February or March. Sampling was done at intervals of two to three weeks throughout the entire shipping period for each variety. All samples were collected from the periphery of the tree and at a height of from 3 to 6 feet, insofar as possible. Analyses were made on the same day of collection or as shortly thereafter as possible. The analyses were made by F. F. Cowart (a) in 1940 and 1941, by C. R. Stearns (b) in

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/2 Entomologist, Citrus Experiment Station, Lake Alfred, Florida.

1942 and 1945 and by J. W. Sites in 1943, 1944, and by H. J. Reitz (c) and J. W. Sites in 1946 and 1947.

The trees in the experimental plots were sprayed with commercial oil emulsion at the rates of 1.3% and 1.5% actual oil*. During any one year the same concentration of oil was used uniformly in every plot so that the only variable was the timing of the oil spray. In the whole experiment over 700 trees were used; the plots varied in size from 4 to 7 trees and all treatments were duplicated.

Soluble Solids (Brix). — Since the soluble solids content of citrus juice, when balanced by proper acidity is probably the best single criterion for determining juice quality, changes in the soluble solids content as affected by timing of the oil sprays have been watched closely. Any effect which timing of this spray has on the soluble solids content of the juice of early oranges is especially important because failure to move these varieties early is usually caused by low soluble solids rather than by a low ratio. Data for the 1946-47 season for Hamlin oranges are presented in Table 1 by treatment and by sampling dates. Tables 2 and 3 present the seasonal averages for the same season for all varieties of oranges and grapefruit under test. Oil emulsion sprays applied on either June 15, July 1 or July 15, in general, reduced soluble solids in the juice of orange varieties less than oil sprays applied on other dates with the exception of sprays in either November or December. In the latter cases the oil was applied so late that only a minimum reduction in soluble solids resulted. Oil emulsion sprays applied during August have always resulted in fruit with lower soluble solids in the juice than similar sprays applied earlier than August. September and October along with August are not recommended as periods suitable for applying oil emulsion sprays. The effect on soluble solids has been slightly variable during these months for in 1941 and 1943 the soluble solids were not affected by sprays applied during these months but in the remaining years of the experiment a definite reduction in soluble solids occurred where oil emulsion sprays were applied at this time. In arriving at the period June 15 to July 15 which is recommended in the 1948 Better Fruit Program as the period most acceptable for applying oil emulsion sprays to oranges it was necessary to compromise to some extent. Spraying during this period has resulted in the production of slightly lower quality fruit than was obtained from plots sprayed at earlier dates but has resulted in better scale control.

Excelsior grapefruit has been less affected by the timing of the oil spray than have the orange varieties. Since the beginning of the grapefruit experiments in 1943 there has been a tendency for the plots sprayed in August and September to produce fruit with slightly lower solids content. The differences are less pronounced than with oranges. During the past two seasons the timing of the oil sprays has had no very significant effect upon the quality of the grapefruit produced.

Where scale infestations were severe and two oil emulsion sprays were applied in order to obtain adequate scale control, a combination copper-oil emulsion spray applied at melanose time and followed by an oil emulsion spray six weeks later caused the least reduction in soluble solids of any of the treatments where two oil

Table I.

SUMMARY SHOWING EFFECT OF TIMING OF OIL SPRAYS UPON THE SOLUBLE SOLIDS CONTENTS OF HAMLIN ORANGE JUICE, 1946-47 SEASON. *

	Dates of Oil Application																			
	Cu-Oil — Oil Sprays				Double Oil Sprays					Single Oil Sprays										
Sampling Dates **	April 1 June 15	April 1 July 1	April 1 July 15	April 1 Aug. 1	June 1 July 15	June 1 Aug. 1	June 15 Aug. 1	June 15 Aug. 15	July 1 Aug. 15	July 1	July 15	Aug. 1	Aug. 15	Sept. 1	Sept. 15	Oct. 1	Oct. 15	Nov. 15	Unsprayed Check
Sept. 25	7.72	7.67	7.78	7.45	7.47	7.45	7.00	6.97	6.85	7.65	7.85	7.37	7.67	7.52	—	—	—	—	8.42
Oct. 9	8.16	8.04	7.97	7.65	7.87	7.52	7.22	7.10	7.00	8.10	8.29	7.92	7.80	7.85	7.90	—	—	—	8.73
Oct. 21	8.42	8.50	8.25	8.05	8.10	7.85	7.90	7.20	7.45	8.22	8.57	8.30	8.35	8.22	8.17	8.55	—	—	9.10
Nov. 18	10.05	8.95	8.75	8.65	8.60	8.30	8.02	7.67	7.82	8.95	9.00	8.45	8.60	8.40	8.50	8.50	8.61	—	9.65
Dec. 2	9.23	8.98	9.08	8.58	8.98	8.23	8.05	8.10	7.87	8.78	9.53	8.88	9.03	8.68	8.33	8.40	8.55	9.05	9.88
Jan. 8	9.70	9.30	8.95	8.67	9.40	9.30	8.75	8.15	8.30	9.95	10.12	9.60	9.85	9.10	9.10	9.60	9.20	9.55	11.20
Seasonal Mean	8.88	8.50	8.46	8.18	8.40	8.00	7.74	7.47	7.48	8.61	8.90	8.42	8.46	8.30	—	—	—	—	9.50

Difference necessary between seasonal means for significant differences between spray treatments:
.266 significant (5% level)
.350 highly significant (1% level)

*Trees used in these experiments are young trees, the grove was set with 2 year old trees in the fall of 1939
**Size 250 oranges were used in all determinations.
Values above 8.50 indicate attainment of minimum solids requirements for color-added oranges.

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* The term "oil spray" as used in this paper refers to a single application of an oil emulsion spray at the time indicated. "Two oil sprays" refers to two separate applications of an oil emulsion spray at the times indicated. "Combination copper-oil emulsion" refers to an oil emulsion spray containing a copper compound, the copper compound being used to control melanose, the oil to control scale.

emulsion sprays were applied in the same season. Two oil emulsion sprays applied as June-August, June-September, or June or July-September or October combinations cause very heavy reductions in soluble solids and should not be used for oranges if it can be avoided. This is especially true for early varieties where the soluble solids may be reduced to such an extent that the fruit can not be shipped as color-added fruit at any time during the season because of failure to attain the required 8.50 minimum solids (Table 1). Where a combination copper-oil emulsion spray cannot be used in the first spray and it is necessary to use two oil emulsion sprays, a June 1-July 15 combination, or a close approximation of these dates will give the most satisfactory results. A single combination copper-oil emulsion spray which is not followed by a second oil emulsion spray is not recommended because of failure to give satisfactory scale control. It is much better to be thorough in applying the oil spray and keep scale populations sufficiently well controlled by single oil sprays so that it will not be necessary to use two oil emulsion sprays on either orange or grapefruit varieties. They cause serious reduction in soluble solids of the juice for both and should be avoided whenever possible.

Percent Citric Acid.—The effect of oil spray timing on the acid content of the fruit has been somewhat more variable than on percent soluble solids. During the last two seasons especially, there has been a tendency toward lower acidity in the juice of the fruit where a single oil emulsion spray was applied late in the season, (August or September). Plots receiving two oil emulsion sprays usually produce fruit with lower acid content. There was also a tendency for fruit with lower acidity to be produced on the plots receiving a combination copper-oil emulsion spray which was followed by an oil emulsion spray. During the past two years especially, all of the oranges from the sprayed plots (regardless of the time of application) had a lower acid content than that of the unsprayed checks with the exception of plots sprayed on December 15 which showed no difference. In general, the results follow closely those found for percent soluble solids except that the effect is less pronounced.

Ratio (% Soluble Solids % Citric Acid.—Pineapple, Hamlin and Valencia oranges harvested from plots where oil emulsion sprays were applied during the months of August, September or October show a lower solids to acid ratio than where the spray was applied during June or July. The 1943 and 1945 seasons were exceptions, showing no consistent differences. Excelsior grapefruit did not appear to be affected as much as oranges by the timing of any of these sprays.

Plots receiving two oil emulsion sprays have consistently produced fruit with lower ratio for both grapefruit and oranges with few

Table II.

EFFECT OF TIMING OF THE OIL SPRAY ON INTERNAL QUALITY OF HAMLIN AND VALENCIA ORANGES AS SHOWN BY SEASONAL AVERAGES, 1946 - 47. *

Time of Oil Application	Hamlin Oranges					Valencia Oranges				
	% Soluble Solids	% Citric Acid	Ratio	% Juice by Wt.	Mgs. Ascorbic Acid per 100 ml. of Juice	% Soluble Solids	% Citric Acid	Ratio	% Juice by Wt.	Mgs. Ascorbic Acid per 100 ml. of Juice
Cu-Oil Sprays										
April 1—June 15	8.88	0.80	11.89	51.9	52.3	9.19	0.84	11.22	45.9	39.7
April 1—July 1	8.50	0.82	10.82	52.9	52.7	9.26	0.89	10.70	45.5	41.4
April 1—July 15	8.46	0.71	11.92	52.3	55.2	9.57	0.88	11.14	47.6	41.4
April 1—Aug. 1	8.18	0.77	11.06	52.3	54.3	8.99	0.86	10.75	45.0	39.6
Single Oil Sprays										
July 1	8.61	0.78	11.59	53.4	55.2	9.14	0.92	10.65	45.6	42.1
July 15	8.90	0.80	11.62	53.1	57.9	9.74	1.00	10.02	49.0	46.6
Aug. 1	8.42	0.81	10.89	53.9	56.2	9.10	0.93	10.04	45.2	43.2
Aug. 15	8.46	0.79	11.16	53.2	55.7	9.54	0.99	9.88	45.2	44.9
Sept. 1	8.30	0.79	11.04	51.8	55.9	9.09	0.92	10.15	44.7	42.2
Sept. 15	8.22	0.80	10.75	54.2	55.7	8.71	0.93	9.55	44.3	40.1
Oct. 1	8.50	0.79	11.11	53.8	55.5	8.71	0.98	9.08	46.3	41.8
Oct. 15	8.50	0.83	10.73	54.5	55.4	8.61	0.97	9.03	44.4	40.3
Nov. 15	8.43	0.84	10.72	54.4	53.0	9.14	0.95	9.85	46.5	38.6
Double Oil Sprays										
June 1—July 15	8.40	0.77	11.46	52.4	52.0	9.45	0.93	10.45	47.4	39.8
June 1—Aug. 1	8.00	0.75	11.03	51.4	51.6	8.67	0.83	10.86	42.6	37.6
June 15—Aug. 1	7.74	0.75	10.69	52.2	50.2	8.48	0.84	10.32	40.8	35.0
June 15—Aug. 15	7.47	0.74	10.44	51.8	49.5	8.07	0.83	10.00	42.4	38.6
July 1—Aug. 15	7.48	0.74	10.54	51.4	50.1	8.42	0.90	9.51	43.4	42.1
Unsprayed Check	9.50	0.91	11.41	53.6	62.3	9.94	0.97	10.48	47.4	47.5

*Averages include following sampling dates:
Hamlin Oranges—Sept. 25, Oct. 9, Oct. 21, Nov. 18, Dec. 2, Jan. 8—Size 250.
Valencia Oranges—Jan. 15, Jan. 27, Feb. 20, March 5, March 24, April 10—Size 200.

exceptions, these occurring principally during the 1945 season. There is some question as to how much value should be placed on the results of this season since all of the plots contained considerable "June-bloom" fruit and it was very difficult to keep the samples free of this fruit. The fact that lower ratios were found to exist most of the seasons where the fruit was sprayed late lends additional support to spraying during June and July.

Juice Content—Juice content was determined as juice per fruit, in the case of grapefruit, and as gallons of juice per box for oranges; and as percent of juice by weight for all varieties; only the latter data are included in Tables 1 and 3. During the period of time in which this experiment has been running there have been some noticeable differences in juice content of fruit as related to timing of the oil sprays, but these differences have varied considerably from season to season. In 1946-47 and 1947-48 two oil emulsion sprays, the first applied during June and the second during August, reduced the percent of juice by weight and volume of juice per fruit of Valencia oranges an appreciable amount. Pineapple oranges and Excelsior grapefruit showed a similar but less pronounced trend, whereas Hamlin oranges failed to show any consistent relationship during the same period. Although the evidence is not as clear-cut as would be desired the fruit from the plots receiving an oil emulsion spray applied late and those which received two oil emulsion sprays showed a reduction in juice volume per fruit and in percent of juice by weight.

Vitamin C.—The vitamin C or ascorbic acid content of the fruit has varied with the season and to some extent between varieties in regard to the effect of timing of the oil spray. Fruit from the plots of all orange varieties were affected to about the same extent in the 1946-47 and 1947-48 seasons and showed significant reductions in vitamin C content of the juice where late oil emulsion sprays and where two oil emulsion sprays were applied. All orange varieties contained less ascorbic acid where the trees received two oil emulsion sprays, where the first was applied during June or July and the second in August, September or October. Similar sprays applied during these months also reduced the vitamin C content of Excelsior grapefruit, but the loss was less than for oranges. During the 1946-47 season the unsprayed check plots in the Hamlin, Pineapple and Valencia blocks contained more vitamin C in the juice of the fruit than was found in any of the fruit from oil sprayed plots, but during the majority of seasons there was little difference between the unsprayed checks and the June and July sprayed plots. Excelsior grapefruit showed no reduction in vitamin C where the oil emulsion was applied in June or July in 1946-47.

Table III.
EFFECT OF TIMING OF THE OIL SPRAY ON INTERNAL QUALITY OF PINEAPPLE ORANGES AND EXCELSIOR GRAPEFRUIT AS SHOWN BY SEASONAL AVERAGES, 1946-47.*

Pineapple Oranges						Excelsior Grapefruit					
Time of Oil Application	% Soluble Solids	% Citric Acid	Ratio	% Juice by Wt.	Mgs. Ascorbic Acid per 100 ml. of Juice	Time of Oil Application	% Soluble Solids	% Citric Acid	Ratio	% Juice by Wt.	Mgs. Ascorbic Acid per 100 ml. of Juice
Cu-Oil Sprays											
April 1—June 15	10.37	0.99	10.73	49.9	56.9						
Single Oil Sprays						Single Oil Sprays					
June 15	10.55	1.05	9.72	50.4	61.9	June 15	8.31	1.28	6.45	45	36.1
July 1	10.38	1.05	10.26	50.9	61.7	July 1	8.56	1.33	6.43	45	38.5
July 15	10.28	1.06	10.05	50.5	60.4	July 15	8.42	1.30	6.53	44	37.7
Aug. 1	9.85	1.07	9.42	50.6	60.4	Aug. 2	8.47	1.34	6.46	45	40.0
Aug. 15	9.82	1.09	9.18	50.0	60.7	Aug. 15	8.43	1.30	6.55	44	38.1
Sept. 15	10.13	1.09	9.61	51.3	63.6	Sept. 15	8.53	1.32	6.49	44	38.9
Oct. 15	9.96	1.07	9.57	49.8	63.2	Oct. 15	8.45	1.34	6.35	44	39.0
Nov. 15	10.45	1.15	9.32	50.5	64.2	Nov. 15	8.48	1.44	5.92	45	38.6
Dec. 15	10.81	1.14	9.68	50.0	66.5						
Double Oil Sprays						Double Oil Sprays					
June 15—Aug. 1	9.25	1.05	8.97	49.9	52.6	June 15—Aug. 1	7.73	1.26	6.16	44	35.6
June 15—Sept. 15	9.37	1.07	8.92	51.9	57.1	June 15—Sept. 15	8.01	1.26	6.37	44	35.3
June 15—Oct. 15	9.50	1.01	9.37	50.7	57.5	June 15—Oct. 15	8.23	1.28	6.38	46	36.1
July 1—Nov. 15	9.62	1.03	9.44	51.4	59.3						
Unsprayed Check	11.20	1.14	10.03	50.1	69.2	Unsprayed Check	8.45	1.36	6.25	46	37.3

*Averages include the following sampling dates:
Pineapple Oranges—Oct. 15, Nov. 4, Nov. 20, Dec. 2, Dec. 16, Jan. 8, Jan. 29—Size 200.
Excelsior Grapefruit—Sept. 23, Oct. 8, Oct. 21, Nov. 4, Nov. 21, Dec. 2, Dec. 16, Jan. 28—Size 64.

Timing of the Oil Spray Affects Scale Control

There are a number of factors to be considered beside the relationship of fruit quality and general maturity of fruit to the timing of oil sprays. Since oil emulsion sprays are applied for the control of scale insects, it is essential that the spray be applied during a time when the longest period of control can be obtained with the least injurious effects to the trees and the fruit. Thompson 1942 (5) reported that a satisfactory period to control purple scale on grapefruit was between May 15 and August 1 and for oranges June 15

to August 1. This period is still considered a satisfactory time to control scale except that additional experimental work has shown that April and May applications have not been so satisfactory as June and July oil sprays. Under most conditions a combination copper-oil emulsion spray applied in April or May has not been as satisfactory as a June or July oil emulsion application. Griffith 1947 (1) reported a study of scale control obtained in 422 commercial sprayed groves during 1945 and 1946. He shows that the most failures occurred when the oil sprays were applied between January and June 1, and there were more failures where the sprays were applied in June than in July.

The timing of oil sprays for the control of the Florida red scale should probably be a little more exact. Thompson (5) recommended the period between June 15 and July 15 and further experimental work has substantiated the earlier work. If the period is too short between June 15 and July 15 to cover the acreage it is better to apply the spray in late July than during late May or early June. Griffiths (1) work further supports that of Thompson.

Sometimes it is necessary to apply two oil sprays during one season to control a heavy infestation of purple scale or red scale. Excellent results have been obtained by applying a combination copper-oil emulsion spray one to three weeks after the fruit has set, followed in six to seven weeks with the usual oil emulsion spray. It should be understood that the copper is added to the oil in the first spray as a fungicide to control melanose and not as a scalicide. It has been found that very little injury has developed on oranges where combination copper-oil emulsion sprays were applied before the average fruit had reached three-fourths of an inch in diameter but as the size of the fruit increased or became infected with melanose before the application, the percentage of injury was increased. As far as scale control is concerned an oil emulsion spray applied in early June and followed with a second application in six to seven weeks has resulted in excellent control; however, since two oil emulsion sprays affect solids very materially when the second spray is applied in late July or in August it is recommended that where two oil sprays are contemplated on oranges that a combination copper-oil emulsion be applied soon after the fruit has set and followed with an oil emulsion spray by July 15 .

Fruit Coloring As Related to Timing of the Oil Spray

When early summer oils have been applied there has been less trouble in degreening fruit early in the fall. It is a well established fact that oil sprays retard the degreening of the fruit, Yothers (8) Winston (7) and Thompson (5). Many people think that the effect of an oil emulsion spray on fruit has disappeared six weeks after the application but such is not the case. An oil emulsion spray may have an effect on degreening fruit four to five months after the application if the nights are warm during October and November. From the standpoint of timing oil sprays to obtain the least retarding of degreening of early varieties the same dates should be observed as with timing the sprays.

(Continued on Page 26)

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A CITRUS GROWER FOR GOVERNOR

Florida citrus growers this year have the opportunity of placing one of their own members in the Governor's chair at Tallahassee. Florida once had a citrus grower as Governor, a man whom most Floridians believe was the best Governor the state ever had, and who upon his retirement from that high office was elevated to the still higher position of United States Senator. It might not be a bad idea to elect another citrus grower as Governor.

In Dan McCarty of Fort Pierce, citrus grower, cattle breeder and businessman, the people of Florida have a man of the same calibre, the same high character and sterling worth as that other Citrus-Grower-Governor—Spessard Holland. But it is not alone as a citrus grower that Dan McCarty appeals to this publication and to the citrus growers of Florida as the top-notch candidate for Governor.

Although yet a young man, Dan McCarty is known throughout the state as a man of sterling honesty, unquestioned integrity and high ability. Possessed of a wide range of legislative and executive experience, he has the courage of his convictions and a tenacity of purpose which fit him for the manifold duties which will devolve on the state's chief executive in the years immediately ahead. A veteran of the late war, a clear-headed, straight thinking, plain-talking individual, he possesses just those qualities which appeal to the average citizen as essential to one who aspires to become the chief administrator of the state.

This publication has no hesitancy in giving its unqualified support to Dan McCarty. It believes that citrus growers generally will be found doing likewise, not merely because he is one of them, but also because they believe him to be the best qualified of all candidates to give the state the kind of administration it requires.

"DISTRESS MERCHANDISE"

The following from the March issue of the California Citrograph may have a direct application to the situation in Florida, a situation which is seriously considered by growers, canners and processors in this state:

"A visitor in the East recently tells of special retail offerings of Florida orange juice, two 46-oz. cans for 23 cents. And two 46-oz. cans of grapefruit juice for 29 cents.

"Obviously this is distress merchandise. No canner could put tin around bilge water and come out at that price. Other instances of fantastically low prices for canned citrus juices come to notice much too frequently.

"All of which points up the need for some sort of national marketing agreement covering the canned products. Certainly such prices should soon force the issue.

"An obstruction to this is the natural conflict of interest between growers and processors in areas where growers are not well organized on a cooperative basis. When the fruit is in the can the processor ordinarily has about as much invested as the value of the fruit represents to the grower.

"It seems reasonable to determine the quantity of peaches, or orange juice or grapefruit juice the nation will consume, and process no more than that. Processing more than will be consumed serves no purpose but to break the market.

"If a good reason is needed for working out a sensible marketing agreement, the industry has it: Distress merchandise."

"FIRST THINGS FIRST"

Under the above title, Texas Farming and Citriculture, a magazine devoted to the agricultural and horitcultural industries of Texas, points out that while the solution of cultural problems are of vital concern to citrus growers in the long-range view, that what is immediately needed is some solution of the marketing problems which will assure the grower of at least cost of production.

Pointing to the fact that most Texas citrus growers have, during the present season, been forced to sell their fruit at a loss, and that the price received by the growers foots up to about one-tenth of the price paid by the ultimate consumer, the magazine concludes that the immedaite need of the growers in that state is a revision of the system under which their fruit is placed upon the market.

In that view the Texas growers are not alone. Florida growers are faced with the same problem, with which the Florida Citrus Mutual is now wrestling, with apparently fair progress being made. Such organizations in each of the citrus producing states, with some sort of over-all national supervision, should go far toward the solution of the marketing problem. But, eventually, the states must join hands in the solution of their problems. Purely local or state organizations may, and doubtless will, help — but the ultimate need is unified action — nationally.

The first requirement of any successful citrus operation is the production of QUALITY fruit; the second requirement is the proper control of distribution and marketing which will assure the grower of a price at least somewhat above the cost of production. The second requirement cannot hope to be attained except in combination with the first More and more Florida citrus growers are becoming convinced of this most essential fact.

Grasshopper Control In Citrus Groves In Florida...

JAMES T. GRIFFITHS, Jr. /1
JOHN R. KING /2, and
W. L. THOMPSON /3
Citrus Experiment Station, Lake Alfred, Florida at meeting Florida State Horticultural Society.

In May 1947, grasshoppers of the species **Schistocerca americana** (Drury) were reported as doing damage in citrus groves in southeastern Hillsborough County. Since this grasshopper was formerly thought to cause damage only in the fall of the year, the situation was regarded as abnormal and potentially serious. A survey indicated that grasshoppers were abundant over a fairly wide area and that some control measures would be necessary. The following is an account of the 1947 infestation and a review of the control program proposed for this pest.

In the fall of 1946, heavier than normal populations of grasshoppers were present in western Polk and southeastern Hillsborough Counties. Benzene hexachloride was used as a dust (0.6% gamma isomer) and as a spray at the rate of 2 to 3 pounds of wettable powder (6% gamma isomer) per 100 gallons of spray. This proved to be an effective control measure. In January and again in March of 1947 casual observations were made and it was noted that adult grasshoppers were in the fields. It is not known at present whether these represented relatively newly emerged adults or whether they were left from the fall generation. The fall of 1946 was abnormally warm and it is suggested here that there may have been at least a partial or possibly a complete extra generation in the fall. In any case it appears that the warm fall and winter offered favorable overwintering habitats and this was a major factor in the abnormal increase in grasshopper numbers in 1947.

There was a heavy hatch of grasshoppers about May 1, 1947. The last of May showed a population which was generally about 1/3 to 1/2 grown. By late June a few of these individuals had grown wings and were present as adults, Adults continued to mature and in late July most of the grasshopper population was in the adult stage. There was some oviposition in late July and eggs began to hatch shortly after August 1. Through the cooperation of the Bureau of Entomology and Plant Quarantine, Mr. Andrew Frazier came into the state in July and he was able to make a thorough survey of the infestations. He found the grasshoppers mainly in the area south of Plant City in Hillsborough County, both north and south of Lakeland in Polk County, and in scattered places from Bartow to Wauchula in Polk and Hardee Counties. There were occasional infestations on the east coast, but they were of minor importance. In the central part of the state, it appeared that grasshopper infestations were associated with areas where crab grass was the predominant type of cover crop and where groves were adjacent to old vegetable fields. Groves had become infested both from adjacent fields and from hatch within the grove itself.

The second generation of hoppers hatched throughout August with the bulk of the hatch occurring between August 15 and August 25. From 50 to 100 individuals hatched from each egg pod and these remained clustered together in a colony for more than a week. These nymphal grasshoppers grew and began to reach maturity in mid-September. October 10 marked the peak of maturation and following that date the bulk of the population was present as adults. Up to November 1, no copulations or oviposition has been observed in the field. Whether a partial third generation may occur remains to be determined. Damage was most serious in June and early July and again in September and October. These periods coincided with times when young grasshoppers were more than half grown. Apparently they feed most heavily at that time in their life history. As very small individuals and as adults they do a minimum of damage to citrus foliage.

Control by Insecticides

A review of recent literature on grasshopper control (Hinman, 1947; Weinman, 1947; and List, 1947) indicated that 3 new chlorinated hydrocarbons were showing promise for grasshopper control. These were benzene hexachloride at about 0.3 lb. of gamma isomer per acre, chlordane at 1.0 lb. per acre and chlorinated camphene at 3.0 lbs. per acre. These dosages are arbitrary averages, but they seem to represent approximate figures at which other workers were obtaining control. Since citrus groves ordinarily require more spray or dust than vegetable or field crops, it was decided to try these materials for toxicity to grasshoppers and if they appeared satisfactory, they would be applied at the rate of 50% more toxicant per acre than the figures cited above. A total of 9 experiments were performed on a field scale. Plots varied in size from 1 to 5 acres. These tests were performed between July 15 and October 25.

The first 2 experiments were performed in mid-July in a grove where a heavy grasshopper population was present. The dusts were applied by airplane both in the grove and in adjacent grasslands. It was determined from these preliminary tests that an airplane flying each middle of a grove was a satisfactory method of application for grasshopper control; benzene hexachloride, chlorinated camphene, and chlordane were satisfactory toxicants; and that results were much better where the cover crop was chopped prior to treatment.

Only 1 experiment is being reported in detail. In this test 4 materials, chlordane, chlorinated camphene, benzene hexachloride, and thiophos 3422, were used both as wettable powders and as dusts. The grove was composed of large grape-

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fruit and orange trees and each plot contained 2 acres. Sprays were applied by a "Speed Sprayer" and dusts with a conventional ground duster. Treatments were randomized and they were adjacent to each other. In all instances the cover crop was chopped prior to spraying or dusting. Treatments were applied on the mornings of August 18 and 19. All 8 treatments gave excellent initial mortality. Counts were made by counting the number of adults seen while walking through a given number of rows. Initial populations found in the adjacent untreated areas were taken as standards and all percent reductions were based on these figures. Table 1 shows the dosages and the percent reductions at 3 intervals following the treatment. After 7 - 8 days the populations in the adjacent untreated areas were materially reduced. This was undoubtedly at least partly due to migration into the treated plots. It will be noted that chlordane and chlorinated camphene gave more prolonged control than did either benzene hexachloride or thiophos 3422. This fact was also substantiated by caging adult grasshoppers from each of the plots and observing mortalities at 24 and 48 hours after caging. No treatment was successful in preventing reinfestation from adjacent areas for more than a few days. This fact emphasizes the importance of treatment not only of an infested grove, but of adjacent areas as well, if completely satisfactory control is to be obtained. In cases where both the grove and adjacent grasslands were treated in July, no further damage was done and the second generation produced only an occasional hopper in the area.

Table 1
Control Effected by Four Sprays and Dusts on Grasshoppers in a Citrus Grove.

Treatment	Lbs. Toxicant per acre	% Reduction After— 1 day	3-4 days	7-8 days
Chlordane spray 1	1.5	95	82	81
Chlordane dust 2	1.5	94	94	89
Chlorinated Champene spray 3	4.5	94	96	89
Chlorinated Camphene dust 4	4.5	96	96	83
Benzene Hexachloride spray 5	0.45	98	89	71
Benzene Hexachloride dust 6	0.45	87	91	68
Thiophos 3422 spray 7	0.45	96	90	74
Thiophos 3422 dust 8	0.45	92	91	71
Untreated		0	0	71

1 50% wettable
2 5% dust
3 33 1-3% wettable
4 10% dust
5 6% wettable
6 1% dust
7 15% wettable
8 1% dust

The experiment reported in detail above was typical of the results obtained elsewhere. Several factors were demonstrated conclusively by observations on these controlled experiments and also by observations where commercial groves were treated by caretakers or owners. Thiophos 3422 is not further considered in this paper because of its non-availability at present and because too little is known concerning its toxicity to fruit and to warm blooded animals. As later experiments developed, it was evident that some slight modifications could be made in the dosages noted in Table 1. Table II shows the toxicant per acre required for control and the amount of dilute material for some of the standard formulations. All recommendations are based on pounds of actual toxicant per acre. Although this is a departure from usual recommendations for spray or dust on citrus, it was definitely established that this method works satisfactorily. The only requirement is that the material be dispersed evenly over both the trees and the cover crop. In young groves that are clean cultivated or in open fields the dosage may be reduced about 33 percent and still give satisfactory control. Dusters should be driven slowly and the dust applied primarily to the lower 6 - 8 feet of the tree and to the cover crop.

All spray recommendations in this paper are based upon the use of a "Speed Sprayer". The number of gallons to be used per acre may vary from about 100 to as high as 1000 gallons. The number of gallons to be used per acre should be established first and sufficient insecticide added to the tank to insure the required amount of toxicant per acre. The authors obtained excellent results by using a double head with all the top nozzles cut off and with only about 25 nozzles open on each side. The sprayer was driven at less than 2 miles per hour and 500 gallons of solution were used per acre. The number of gallons and the number of nozzles may be adjusted to any given situation so long as uniform coverage is obtained and so long as the sprayer moves no faster than 2 miles per hour. Where hand sprayers are used it will usually be necessary to increase the dosage per acre in order to insure good results.

At the present time these mater-

Table II.
Recommended Dosages for Three Materials to be Used for Grasshopper Control in Citrus Groves.

	Sprays			Dusts		
	% Toxicant in Stock Material	Lbs. Toxicant per acre	Lbs. Stock Material per acre	% Toxicant in Stock Material	Lbs. Toxicant per acre	Lbs. Stock Material per acre
Chlordane	50% wettable	1.5-2.0	3-4	5%	1.5-2.0	30-40
Chlorinated Camphene	33 1-3% wettable	3.5-4.5	10.5-13.5	10%	3.5-4.5	35-45
Benzene Hexachloride (gamma isomer)	6% wettable	0.4-0.5	7-8	1% 0.6%	0.4-0.5 0.4-0.5	40-50 70-80

ials can be recommended for use with either wettable or dusting sulfur. The possibilities for using them in other mixtures is being determined. None can be used with lime-sulfur and benzene hexachloride should never be used with oil. Chlordane and chlorinated camphene were found to be satisfactory when used as emulsifiable materials as well as in wettable form.

In choosing the insecticide to use, several factors should be considered. Since all are effective, cost per acre should be taken into account. Chlordane and chlorinated camphene have greater residual toxicity. but present results do not indicate that this is of major importance. According to work in 1947, chlordane and chlorinated camphene may be used at any time. **However, benzene hexachloride should not be used on fruit prior to September 1.** In its crude form it may impart an undersirable flavor to fruit when used either as a dust or as a spray. This fact was first noted in 1946 when trees were sprayed with benzene hexachloride in oil. In 1947, there was an undesirable taste in early oranges in some of the groves dusted or sprayed in July and August. There had been no taste noted in fruit treated after September 1. Until this phenomenon is better understood, benzene hexachloride will not be recommended for use on citrus trees bearing fruit until after September 1.

Some growers have believed that sulfur acted as a repellant to grasshoppers. One experiment, performed in triplicate, was made where trees were dusted with sulfur, sprayed with wettable sulfur and sprayed with lime-sulfur. There were as many grasshoppers on the treated as on the untreated trees during the following days. Casual observations on groves sprayed with sulfur showed no decrease in the grasshopper population. It was therefore concluded that sulfur on citrus has little or no repellency to the American or bird grasshopper under Florida conditions.

Cultural Practices

Many divergent opinions have been advanced as to the effects of discing or chopping on grasshopper infestations in groves. Enough general observations were made during the 1947 season to determine these effects with some degree of reliability. In general. grasshoppers were found in groves where the cover crop was composed of some type of grass. This grass was usually of the crab grass group. Apparently this type of sod offered a place which was satisfactory for oviposition and also a good food source for growing nymphs. Observations indicated that chopping or discing could be either detrimental or beneficial according to the timing of the operation and the age of the grasshoppers at the time. Thus, chopping or discing the cover crop should be avoided at a time when most of the

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grasshoppers are present as large nymphs. At this time since the nymphs cannot fly, they will migrate immediately to the trees and unless insecticide is applied, they may do serious damage.

As noted in the introductory paragraphs, the second generation of the bird grasshopper hatched mainly during the second and third weeks of August. By August 25 the bulk of the hatch had been completed. Two groves, both heavily infested, were selected as places to study the effect of discing on newly hatched nymphs. One grove was composed of 2 to 3 year old orange trees and the other of 10 year old Valencias on sour orange root stock. On August 18 half of each grove was disced in both directions. Results were checked by counting the colonies of newly nymphs. Table III shows the results. On August 22 the number of colonies were counted in 10 checks or squares. A check or square constituted an area with 4 adjacent trees as corners. Three days after discing there was a reduction in 1 grove. but none in the other. The discing had not been sufficient to chop up and kill the cover crop which was present. Therefore on August 25 the areas were rediscd and this time one discing was on the diagonal. Two days later nymph colonies were again counted and this time there was a significant reduction in both groves. On September 15, a check was again made on the populations in these groves. This time the number of nymphs taken per one hundred sweeps with a standard insect net was taken as the criterion of infestation. As noted in Table II, there was at least a 90 percent reduction in both groves. In another grove which was disced clean about September 10, sweeps were made on September 15 and there were 56 nymphs per 100 sweeps in the chopped as compared with only 6 in the disced area. Thus, it appeared that discing at the end of a hatching period or within 2 weeks thereafter was a means of effectively reducing a potentially serious infestation to one of no economic importance. It should also be noted that these disced areas were not reinfested at a later date.

The explanation for the marked reduction in young nymphal grasshoppers following clean cultivation was probably due to a combination of 2 factors. On one hot afternoon when the air temperature was above 95 degrees F. and the soil surface was 115 degrees F., newly emerged nymphs were thrown on this hot surface and they were able to survive for only a few minutes unless they were able to find an unkilled blade of grass upon which to crawl. The other factor concerned is one of food source. The tiny grasshoppers can only move short distances and if food is not readily available, they can be easily starved to death.

In late October another fact concerning discing became evident. Where almost the entire population was present as adults, it was found that thorough and clean cultivation caused the winged individuals to migrate from the grove into adjacent areas. This was tried with complete success in 2 groves. Although this method may not be completely effective in all circumstances, it offers a means of control in many places at a minimum of trouble and expense. However, the grower should be ready to appy insecticide if for some reason the grasshoppers fail to leave the grove.

Recommendations for Control

The following recommendations are based on only 1 season's intensive work and it is possible that some alterations will be necessary in the future. However, it is believed that the following suggestions will afford an effective and economically feasible program.

It is not known at present how the bird grasshopper passes the winter, but it is established with certainty that there will be a hatch in the spring of 1948. In 1947 this occurred in April and May. If groves are maintained in a state of clean cultivation from November until about May 15 to June 1, it is believed that no eggs will be laid there and the only grasshoppers which can attack the grove in June must of necessity come from adjacent fence rows and fields.

If grasshoppers appear in serious proportions in a grove in June. they may be controlled by the use of chlordane (1½ - 2 lbs. per acre) or chlorinated camphene (3.5 - 4.5 lbs. per acre) used either as dusts or sprays. Where none develop in June, but where it is anticipated that there will be grasshoppers in the fall, cover crop management should be such as to assure a crop of seed by late August. This involves no chopping after mid-June. Then, if a hatch occurs in the grove in August, there will be no objection to discing in the cover crop within 2 weeks after the hatch has occurred and thus obtain control. If, in spite of these practices, there are infestations later in the fall, they may be controlled by the use of the 2 materials mentioned above or by benzene hexachloride (0.4 - 0.5 lb. gamma isomer per acre) either as a spray or dust. If the bulk of the population is in the adult stage. it may be forced out of the grove by thorough discing after mid-October. Discing or chopping when hoppers are about half grown should be avoided as they will not be killed by the operation, and since they cannot fly, they will move onto the trees where they may do excessive damage.

Groves should always be prepared for dusting or spraying by first chopping the cover crop. This resulted in much better control than where cover crops were standing at the time of application.

Table III.
Effects of Discing on Grasshopper Populations

		3 Year Old Trees		10 Year Old Trees	
	Date	Chopped	Disced	Chopped	Disced
Three days after discing (Colonies per square)	8/22/47	7.4	7.6	6.9	2.1
Three days after second discing (Colonies per square)	8/28/47	4.6	0.3	8.6	0.1
Grasshopper nymphs per 100 sweeps	9/15/47	60	4	240	11

Summary

An account of the 1947 grasshopper problem on Florida citrus is presented. There were 2 genera-

(Continued on page 26)

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Relation Of Irrigation To Creasing In Oranges In Florida...

ERSTON V. MILLER
Physiologist*, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, and

JAMES TURBULL
Civil Engineer, Soil Conservation Service, U. S. Department of Agriculture.

This study was begun during the season of 1945-46 as a cooperative project of the Bureau of Plant Industry, Soils, and Agricultural Engineering and the Soil Conservation Service. The soil Conservation Service has studied the relationship between irrigation and yield of oranges and the Bureau has investigated factors associated with rind breakdown and decay of the fruits in storage. Observations on creasing made at the time that samples were collected for storage are presented here. The results of other phases of the work will be published later.

Creasing is characterized by irregular grooves or depressions running in various directions over the surface of the fruit, often producing irregular patterns. These grooves are caused by fissures or gaps in the inner, spongy portion of the rind (albedo) and the sinking of the overlying oilbearing layer (flavedo). Splitting frequently follows creasing, either before harvest or during post-harvest handling.

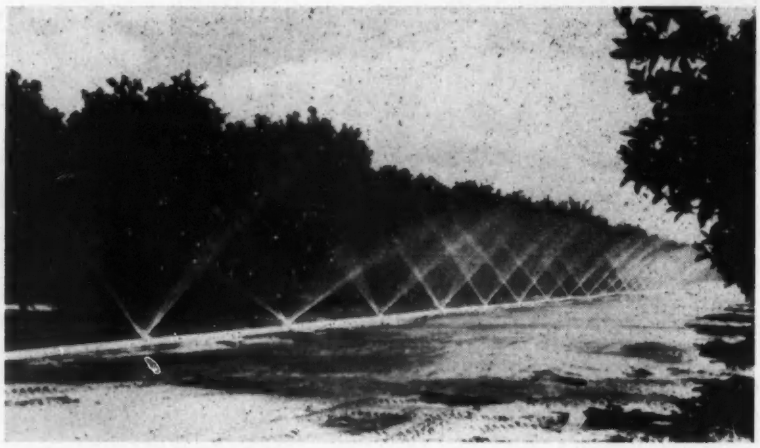
The grove in which the work was done is located near Haines City, Florida, and consists of Valencia orange trees about 26 years old, budded on rough lemon rootstock. The soil type is Lakeland fine sand.

There were seven experimental plots of 45 trees each, 9 rows long by 5 rows wide; but only the inner 2 trees were considered in the plot averages. The results reported herein were taken from a control plot, which received no irrigation water, and three randomized pairs of irrigated plots receiving respectively, 1.5, 2.5, or 3.5, inches of irrigation water at each application.

* Now Professor of Biology, University of Pittsburgh.

The plots were irrigated on a schedule approximating that used in commercial groves in the "Ridge" section of Florida; that is, when the trees were approaching close to the wilting point. All other cultural practices were uniform throughout the seven plots. Figure 1 shows the amount of rainfall and irrigation water received by the plots during the period of this study, and also the creasing found in fruit from trees receiving the different amounts of irrigation.

Irrigation water was pumped from a small lake adjacent to the experi-



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mental grove and was applied by means of a low-pressure. portable pipe sprinkler system having sprinkler gates spaced every eight feet along the line. The rate of application of irrigation was adjusted to prevent surface runoff from developing so that each plot received its full quota of water.

During each of the two seasons records were obtained on oranges collected from the control plot and from one of each of the duplicate plots receiving the varying amounts of irrigation water. Five field crates of oranges were collected from each of these four plots three times during each season. The dates of the collections were approximately March 1, April 1, and May 1; commercial picking in the grove was May 10-14, 1946, and May 2-16, 1947. These samples were held in storage for observation on development of breakdown and decay. Notes on creasing were made at the time of each collection. During the second season, when there appeared to be an unusual amount if creasing. additional data were obtained by making counts on over 90 field crates at the time of commercial picking, May 2-16, 1947. The records made at this time were taken from all seven of the experimental plots.

Results

During the citrus season of 1945-46 no creasing was observed in the oranges until the time of the last collection. At that time the control plot showed 1 percent creased fruit; the plot receiving 1.5-inch irrigations, 2.3 percent; that with 2.5-inch irrigations, 1.5 percent; and that with 3.5-inch irrigations. 4.9.

Table 1. Percentage of Creasing Found in Valencia Oranges from Trees Receiving Different Irrigation Treatments.

(Records show percentages of creased fruit at time of commercial picking.)

Irrigation:	(0 inches)	(1.5 inches)	(2.5 inches)	(3.5 inches)
Creased Fruit	3.5	10.8	6.6	10.2

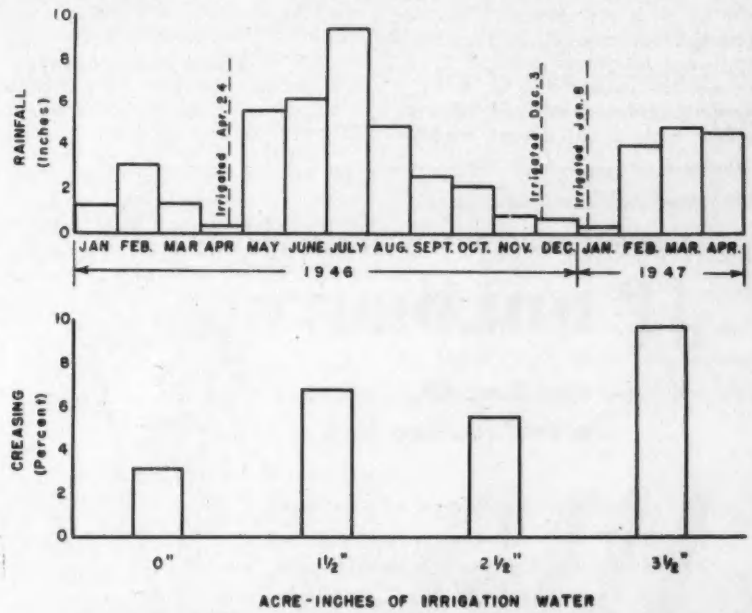

Figure 1. Monthly Rainfall and Irrigation Water received by Test Plots During 1945-46 and 1946-47, and Percentages of Creasing Found in Fruit from Trees Receiving the Different Amounts of Irrigation. Average of all observations.

During the season of 1946-47 an unusual amount of creasing appeared in many groves throughout the State of Florida. In the experimental plots creasing was observed in the oranges at each collection date, the average percentages of creasing for all three collections being as follows: control plot, 3.6 percent; 1.5-inch irrigations, 7.0 percent; 2.5-inch irrigations, 6.7 percent; and 3.5 - inch irrigations, 11.2 percent.

The percentage of creasing observed in the field crates at the time of commercial picking is shown in table 1. These records were obtained from a total of 90 field crates picked in the seven plots. The figures are similar to those obtained from the samples collected for storage. Percentages of creasing were as follows: control lot, 3.5%; 1.5-inch irrigations, 10.8; 2.5-inch irrigations. 6.6; and 3.5-inch irrigations, 10.2.

As a means of summing up the results, all of the data on creasing have been averaged and are presented in the form of a graph (See figure 1). The results include those obtained in the experimental plots during the two seasons as well as those obtained during observations made at the time of commercial picking in 1947. The graph also shows the amount of water that the plots received, either as irrigation or in the form of rainfall. It will be observed that averaging all of the results does not change the pattern at all. The most creasing was found in fruits in the plot with 3.5-inch irrigations, and the least in the controls. The other two plots showed an intermediate amount of creasing, with the 1.5-inch plot a little higher than the 2.5-inch plot.

From these results it is not clear whether irrigation in itself caused creasing of oranges or whether it aggravated a condition already present. During the course of a five-year study of rind breakdown in oranges it has been observed that creasing occurs most frequently in oranges produced on the lighter soils (Lakeland and Blanton fine sands). This might suggest the possibility that the irrigation water tends to increase the leaching out of some of the essential elements. If soil moisture in itself were responsible for creasing, more of this disorder should be found in fruit grown on the wetter soils, such as occur in the low hammocks, and this is not the case. It seems somewhat more probable that the relation of irrigation to creasing is through the sudden stimulation of growth and consequent rupture of the spongy albedo tissues due to the application of water when the tree is on the verge of suffering from drought. If this relationship actually exists it should be possible to prevent creasing by irrigating so as to maintain an adequate supply of soil moisture at all times rather than waiting until the trees begin to suffer from drought.

New Insecticides And Their Application On Citrus...

W. L. THOMPSON
and
J. T. GRIFFITHS
At Meeting of Florida State Horticultural Society

(Concluded From Last Month)

The most extensive use of BHC in citrus groves has been for the control of grasshoppers. Griffiths et al. (1947) found that a BHC dust containing 1 percent of the gamma isomer and applied at the rate of 45 pounds per acre was effective for grasshopper control. The dust should be applied uniformly on the cover crop and portions of the trees that are infested. Fifty percent BHC wettable material containing 6 percent gamma isomer was effective when used at 1.5 pounds per 100 gallons and applied at the rate of 500 gallons per acre.

Satisfactory control of the citron plant bug infesting oranges was obtained with a spray containing two pounds of a 6 percent gamma isomer wettable BHC per 100 gallons of water. It is possible that a more dilute spray may be effective but until more tests are made, it is recommended that the above dilution be used. A dust containing 1 percent of the gamma isomer was also effective.

Citrus aphids were controlled with a spray containing 2 pounds of a 6 percent gamma isomer in 100 gallons of water. Equal results were obtained when BHC was combined in a spray with a neutral copper and wettable sulfur. Although no tests for residue were made, aphids did not reinfest the portion of the grove where BHC was applied as soon as they did where a rather volatile material was used. A very thorough coverage of infested leaves is necessary for aphid control when BHC is used. In one grove where some of the leaves had been curled by the aphids before the spray was applied, there was a very low percentage of the aphids killed in the curled leaves which emphasizes the need for thorough coverage.

Purple mites were resistant to the toxic effect of BHC. Within a few days after the spray, mites were as numerous in the BHC treated plots as in the untreated ones.

Certain species of ants found in groves were killed by BHC dust but where ant hills were treated with 1 percent BHC dust, some ants were killed but in some cases the whole colony was not killed and it became active again.

Chlordane is a chlorinated hydrocarbon which will probably be used for the control of several species of insects. It is formulated in stable emulsions, wettable powders and in dusts. Alkaline materials should not be used as carriers for chordane because they will reduce its toxicity.

Chlordane has been tested most extensively in Florida for the control of grasshoppers. Griffiths et al. (2), 1947, reported satisfactory control with a 5 percent dust applied at the rate of 30-40 pounds per acre in groves and 20 to 30 pounds in open fields or 1 to 2 year old groves. Control was also obtained with a 50 percent wettable material used at a cncentration of .6 pound per 100 gallons of water and applied at the rate of 500 gallons per acre in the grove. In open fields or in young groves it is recommended that the dilution be increased to 1.6 pounds per 100 gallons and applied at the rate of 125 gallons per acre.

The citron plant bug. **Leptoglossus gonagra,** which sometimes attacks citrus was controlled with the same dosage of chlordane as was used for grasshopper control.

Until recently it has been difficult to control ants which nest at the base of a tree. A 2½ percent chlordane dust has resulted in 90 to 95 percent control of the common species of ants found in groves in the central part of the state; however, when a 5 percent dust was used, all colonies were killed out or at least there was no evidence that the colonies became active again. A dust containing 2½ percent chlordane and 10 percent DDT has also resulted in a 100 percent control of ant colonies. The best method of killing out a colony of ants around the base of a tree is to mix a small amount of chlordane dust with the top inch of soil where

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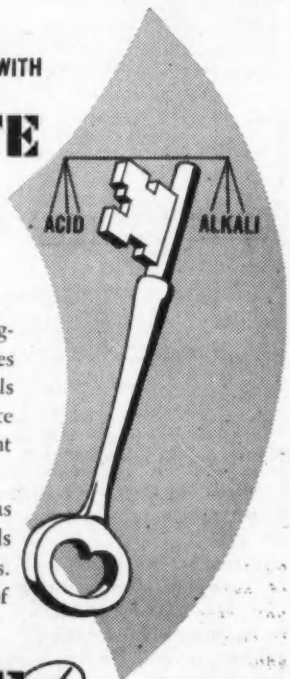

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the ants are working and then sprinkle an additional amount over the top of the soil and around the base of the tree. Where the ant hills are out in the open, a small amount of dust sprinkled in the crater shaped entrance of the hill is sufficient. Injury by ants to young trees was reduced during the winter by sprinkling some chlordane - DDT dust around the base of the tree at the time the tree was banked. In some cases the ants made a nest near the top of the bank and in such cases the dust was placed around the trunks of the tree about one inch below the top of the bank. The leaf eating or agricultural ants can be cotrolled by sprinkling the chlordane dust over the whole surface around the entrance of the nest.

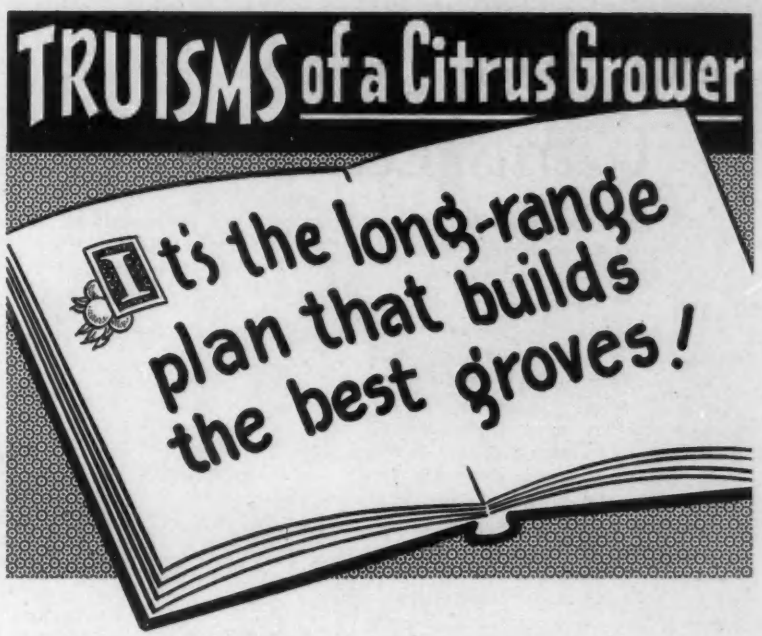
Chlorinated camphene is another of the new chlorinated hydrocarbons. It is being sold as a dust, a wettable powder and as an emulsifiable material. Tests for its usefulness on citrus have been limited to the control of grasshoppers and leaf footed plant bugs. Griffiths et al. (1947) reported that it gave satisfactory control of the bird grasshopper at 35 to 45 pounds of a 10 percent dust per acre, or when used as a spray at 3.5 to 4.5 pounds of the active ingredient per acre. Only preliminary work has been performed on the leaf footed plant bug but a 20 percent dust at 25 pounds per acre showed favorable results.

Hexaethyl tetraphosphate or HETP has been tested for the control of citrus aphids and purple mites. HETP is very volatile and should be used as soon as it is mixed as a dilute spray. It has no residual effect as a spray and should never be combined in sprays containing lime. Precautions should be taken to prevent the concentrated material from coming in contact with the skin.

In experimental tests HETP (100% active ingredient) used at 1-1600, reduced citrus aphids populations 93 to 96 percent where the leaves were not curled. Where it was used in a commercial grove, a medium infestation of citrus aphids was reduced to a very low level.

Where HETP was applied at a concentration of 1-1600 for the control of purple mites, a high percentage of the active mites were killed but, within a week after the application, 9 percent of the leaves

(Continued on page 26)



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Greasy Spots On Citrus Leaves . . .

W. L. Thompson
Citrus Experiment Station
Lake Alfred, Florida

Greasy spot or "greasy melanose" is a peculiar irregular dark spot or group of spots which sometimes develops on citrus leaves. The spots are most frequently on the older leaves, that is, leaves of the preceding year's growth. The affected areas of a leaf are dark brown to black. the center of the spots may be black with dark brown margins. When the spots first appear. they are yellowish brown and may appear on only one surface of the leaf, but in time the spot is apparent on both surfaces and is slightly raised on one side, usually on the under surface. of the leaf. These spots may vary from small dots to areas over a quarter of an inch in diameter or they may be more or less massed over an area of a couple of inches. They may also be scattered over the leaf, but sometimes the affected area is limited to one half of the leaf or along the edge of a leaf that is slightly curled or turned up to the light, Figures 1 and 2.

Greasy spot has been described by various research workers including Stevens (3), Fawcett and Lee (1), and Rhoads and DeBusk (2). According to the above authors no organism has been found associated with the injury. Rhoads and DeBusk state that it has been thought to be a sign of faulty nutrition or a weakened condition of the tree.

Some results of experimental work conducted during the past four years indicate that greasy spot is apparently the result of rust mite injury on the leaves. In 1944 greasy spot was observed in plots which had not received any spray or dust of any kind while it was negligible in adjacent plots that had received a complete spray program, including compounds of zinc, copper, lime, sulfur, and an oil emulsion spray. Greasy spot was also found, to a limited extent, where no oil emulsion had been applied and where the fall sulfur application had been omitted. During the season of 1945-46, which was a year when rust mite infestations were unusually heavy, leaves affected with greasy spot were numerous in all plots of grapefruit trees which were not sprayed with sulfur during the year. The injury was not so noticeable until December or January in these plots, but by February some leaves were severely marked which resulted in a light to medium leaf drop compared to little or no leaf drop in the treated plots.

Even though the indications of rust mite injury seemed obvious, the possibilities of nutritional deficiencies were considered since the common opinion has been that greasy spot was caused by some deficiency. Each year since 1945 greasy spot has been found in all plots that had received zinc and copper compounds which were combined with either wettable sulfur or an oil emulsion as a post-bloom spray. Those plots received no additional sulfur applications during

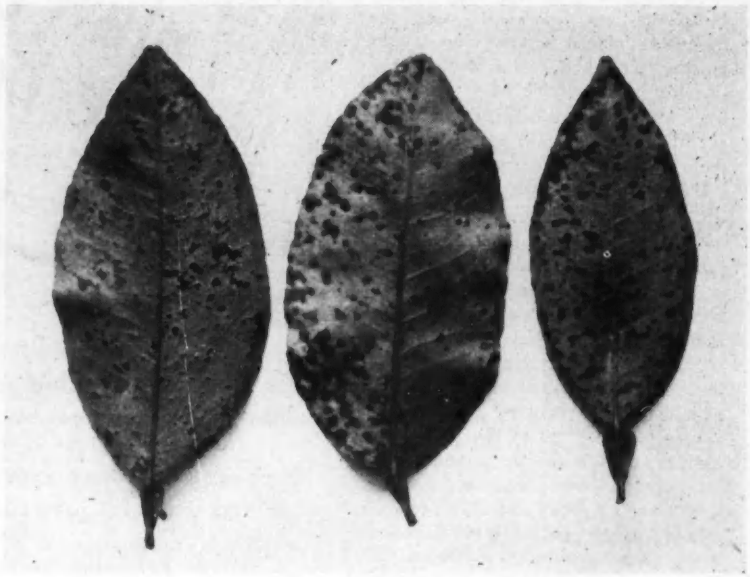

Figure 1.
Greasy spot on the under surfaces of grapefruit leaves
(Photographed by K. W. Loucks)

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the remainder of the year which allowed heavy rust mite infestations to develop on the leaves. It was in those plots as well as in the untreated plots that greasy spot was prevalent. In February of 1948 a record was made of the percentage of twigs with or without leaves affected with greasy spot. Where the rust mite population had been kept down to a minimum with regular sulfur sprays, less than one percent of the twigs had leaves affected with greasy spot compared to a range of 10 percent to 20 percent in plots receiving only a post-bloom spray containing both copper and zinc compounds combined with either wettable sulfur or an oil emulsion; in the untreated plots. 28 percent of the twigs had leaves with greasy spot. Although it has not been determined whether there is any correlation between the severity of greasy spot and the amount of rusty fruit, there are some indications that there may be some connection between the severity of injury on the leaves and fruit. As stated previously, during the season of 1945-46 which was a year when rust mite infestations were unusually heavy and leaves affected with greasy spot were numerous, there was also a high percentage of the fruit injured by rust mites: but during the seasons of 1946-47 and 1947-48 leaves affected with greasy spot were not so numerous nor was the fruit injured by mites during those two seasons to the extent that injury developed during the 1945-46 season.

There are other indications that rust mites cause greasy spot. Rust mites react to certain densities of light, (Yothers, 4). They are sometimes found on only one half of a leaf or concentrated along the margin of a leaf that is slightly curled or turned up towards the light. Sometimes greasy spot also develops on only half of a leaf or along the margin of a leaf in the same general pattern that dense populations of rust mites are sometimes found, (Figure 2). Greasy spot has also been observed on leaves on the top branches of large grapefruit and orange trees when it was difficult to find it anywhere else on the tree. Rust mites are also likely to be more numerous on tree tops than near the ground. especially during the cool months. In one grove where greasy spot was common on tree tops it was found

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that 95 percent of the leaves near the top were infested with rust mites compared to a 15 percent infestation within five or six feet from the ground. One week after a sulfur dust application no mites were observed on leaves within reach from the ground compared to a 75 percent infestation still existing near the tops of the trees. It seems quite possible that failure to obtain control of mites on tree tops is the reason for greasy spot to be found in that area when it is not found on the other portions of the trees. When Dr. A. F. Camp* returned from South America in 1946, he informed the writer that he had observed greasy spot on citrus in Brazil and entomologists there believed it was caused by rust mites.

Within the past three months more cases of greasy spot have been reported from different areas of the state than during the past 10 years. In most cases only one to two sulfur applications had been made in these groves during the year. Up until the late thirties greasy spot was common in many groves and at that time it was the practice to spray or dust with sulfur only when there was fruit on the trees. At times there was a period from August to April when no sulfur applications were made and very dense populations of rust mites built up on the leaves. During recent years it has been recommended in the Better Fruit Program that fall and winter applications of sulfur be made which has resulted in a more or less year around control of rust mites and consequently little leaf damage by mites.

Because of the low prices being received for citrus during the 1947-48 season, especially grapefruit, some growers are again omitting the dormant sulfur application. If such a schedule is attempted, close inspections for rust mites should be made periodically. If a heavy infestation develops on the leaves, it is recommended that a sulfur spray or dust be applied because leaves severely affected with greasy spot usually drop prematurely.

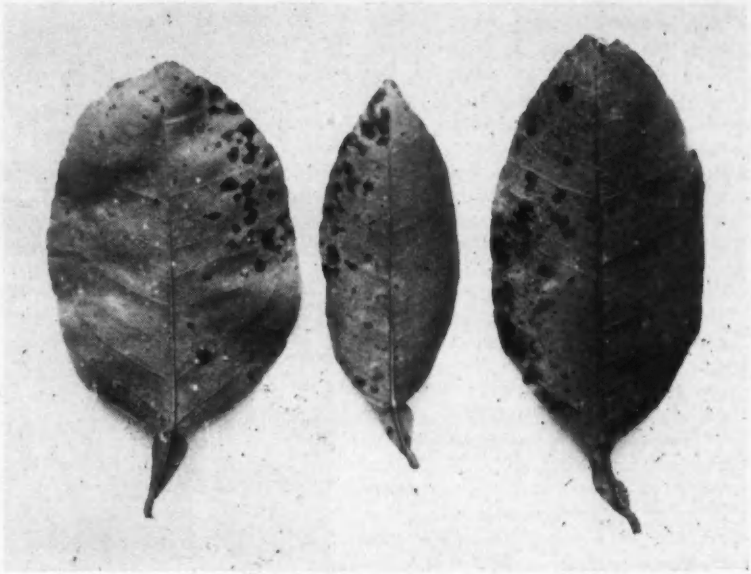

Figure 2.
Greasy spot affecting restricted areas of grapefruit leaves.
(Photographed by K. W. Loucks)

Literature Cited

1. Fawcett and Lee Citrus diseases and their control. 1926.

(Continued on page 26)

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ST. REGIS PAPER COMPANY REPORTS ON 1947....

Sales and Earnings at New High

	1947	1946
NET SALES . . .	$143,864,583	$82,782,186
NET INCOME . .	14,631,325	5,563,603

Year in Review—

Assets: Have expanded to over $130,000,000.

New York Stock Exchange: Preferred and common shares of the Company listed June 16, 1947. Dividend payments on common stock resumed.

Timber Holdings: Increased to over 1,800,000 acres as a result of acquisitions in Maine and Georgia.

Mills and Plants: Total increased to 38. The Pensacola "Kraft Center" is nearing completion and will be the world's largest integrated operation of timber . . . to pulp . . . to kraft paper . . . to multiwall bags. Construction started on $6,000,000 Tacoma kraft mill.

Production Increased: Pulp production now 369,637 tons; paper production (all grades) now 506,255 tons; multiwall bag production now 190,508 tons. Capacity of Panelyte Plastics plant 25,000,000 pounds.

Employees: Have increased to over 13,000.

Stockholders: Now total over 15,000.

SUMMARY OF CONSOLIDATED INCOME FOR THE YEAR ENDED DECEMBER 31, 1947

Net Sales, Royalties and Rentals	$143,864,583.30
Cost of Sales and Expenses	120,445,637.30
Operating Income	23,418,946.00
Income Credits	1,343,654.32
Gross Income	24,762,600.32
Income Charges	678,458.53
Net Income Before Provision for Federal and Foreign Income Taxes	24,084,141.79
Provision for Federal and Foreign Income Taxes	9,325,458.19
Net Income Before Deduction of Minority Interests	14,758,683.60
Deduct Minority Interests in Income	127,358.11
Net Income	14,631,325.49

THE FUTURE

OUR program of expansion and modernization carried on through these recent years has now reached certain desired goals as disclosed by the above data.

Each unit has been strengthened through careful plant modernization, installation of new machines and the acquisition or construction of new plants. It will be our policy to continue these practices in the future to the extent needed to keep our Company abreast of its customers' requirements and to fulfill our responsibility to our employees.

Our products and markets are more diversified and we are continuing the development of new paper and plastic products. Multiwall bags for old and new customers are being produced in larger volume in our own factories from kraft paper of our own manufacture. All these factors are contributing to a greatly strengthened economic position for St. Regis.

In planning and carrying through the Company's expansion and improvement program, we have been prompted by our firm confidence in the sound future of the pulp and paper industry and the importance of its place in the American economy.

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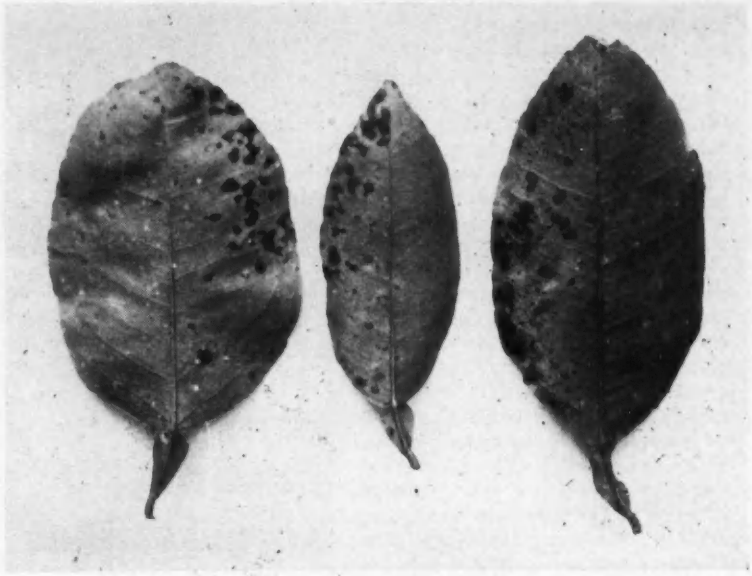

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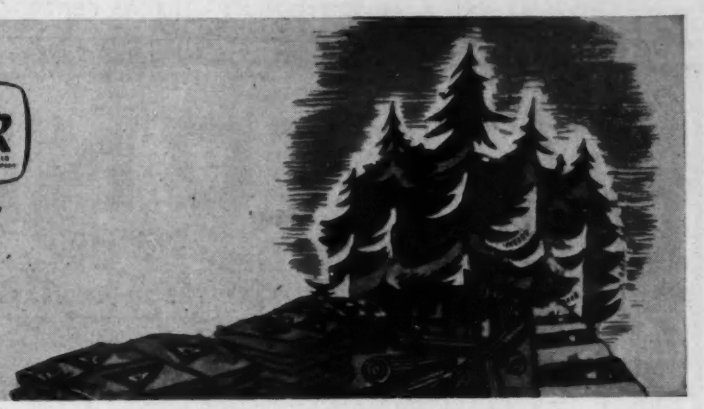

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Reports Of Our Field Men . . .

WEST CENTRAL FLORIDA—
E. A. (Mac) McCartney

Due to heavy rains and some winds the extra heavy bloom has been dissipated. To what extent this will interfere with the future crop is yet to be determined. Everyone is hoping for a good crop. Most growers are fertilizing with a complete mixture or making application of topdresser where the fall application was omitted or the poundage reduced. The cold damage in this territory was severe, especially in Hernando and Pasco Counties. Valencies are now being moved at a rapid rate, but the movement of grapefruit continues very slow. In spite of conditions of the past two seasons, there is a considerable acreage of new plantings in this territory, with valencias as the favorite variety. However, there is one block of 75 acres in Pasco County that is being set to grapefruit. The spring vegetable crop is now beginning to move, with some shipments of cukes from the Webster area. Squash is about ready to be picked and good prices are anticipated.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

We are just about through moving all of our mid-season oranges and are now making heavy shipments of valencias. During the early part of March our shipments were light as a result of bad weather and the prices on the auction market were good. They continued good after heavy shipments started and those growers that still have their valencia crop are hopeful that they will get a good price. The grapefruit situation has been miserable and only a few growers are optimistic enough to think that the situation will be improved very much during the remainder of the season. Most growers in this section are planning to get started somewhat earlier with their summer application of fertilizer than has been the practice. There are a number of growers that will start during the early part of April. Oranges will get their normal application of mixed complete fertilizer, but there is a general tendency to economize on the grapefruit application by not only using cheaper brands, but by cutting the poundage as well. We are advising with our customers that it is impossible to cut the fertilizer application too much if they are to maintain the vigorous condition of their trees and produce quality fruit.

SOUTHWEST FLORIDA
Eaves Allison

Spring came early this year and with it what is probably the heaviest citrus bloom of all time. All varieties of fruit have been white with bloom. For the first time in several years the bloom came in the old time manner, viz, late February, and this should work for quality fruit next year, even though the prospective volume may be larger than we would like. Topdresser was applied sparingly this spring with most growers using an application only where most needed . . . It is very important at this time to keep production cost at the lowest level, hence all growers are watching their fertilizer dollar. Early March rains broke the dry spell in this territory, with some sections getting an over supply. March winds have been hard on young vegetable crops, but have been of some benefit in drying out surplus moisture. Gladiola prices have been low but are picking up for Easter.

POLK COUNTY
J. M. (Jim) Sample

We have had an abundant amount of bloom on practically all varieties of oranges and it is now setting in excellent condition. Tangerines have also shown plenty of bloom, and marsh seedles grapefruit will probably have plenty of fruit. However, there are many common grapefruit groves that have had very little bloom. In fact we know of a number of blocks that have not bloomed at all. Valencias are now being moved to market in heavy volume, and while there is very little activity by fruit buyers the prices have been fairly good on this variety of fruit. The canners have been getting plenty of fruit at reduced prices. Cold damage is showing up in many groves where it was at first thought that there was no damage. This condition is annoying to the packing house operator. We will get our summer application under way during the early part of April and this will be completed by the middle of June.

HILLSBOROUGH & PINEALLAS COUNTIES
C. S. (Charlie) Little

We still have a large tonnage of grapefruit on our trees to be moved to market either through the packing house or the cannery. Growers have been holding their fruit for better prices, and rightly so, in face of the extremely low prices that have been prevailing. We are now making some shipments to the fresh fruit market and the situation looks a little better. Oranges are moving in good volume and prices have been fair. Growers that used only a light topdresser application are planning to come in with an early application of fertilizer this summer that will carry them through the summer months. There are some groves that did not get the spring application until late and of course these groves will not get their summer application until late May or June.

SOUTH POLK, HIGHLANDS & HARDEE COUNTIES
R. L. (Bob) Padgett

We have had many reports from other territories that seedy varieties were putting on and setting a good bloom. This condition does not exist here. We have one of the lightest common grapefruit blooms that growers have seen in a number of years. This is probably caused to some extent by the seedy varieties remaining on the trees over such a long period of time. We have an excellent bloom on all varieties of oranges, tangerines and most marsh seedless grapefruit. Groves throughout the territory are in excellent condition, and most growers will start their summer application of fertilizer in April or May. Our spray program is now getting under way. Many growers that have large holdings of grapefruit will put on a good post bloom spray then control rust mite with dusting sulphur.

In selling any product the element of Quality is always a most important feature . . . still more important than featurin' Quality is seein' that the customer gets the Quality that is advertised . . . this year us citrus growers will have to admit that we didn't have the Quality up to Christmas time, and in some cases our fruit wasn't too awful good for a while after that time. . . 'Course a lot of this trouble was because of the late bloom last spring along with some pretty unfavorable weather and such. Then there was some of us growers who had more or less forgotten about Quality and was strainin' everything just to produce Quantity . . . but this next fall things are goin' to be different . . . we are goin' to have QUALITY then. We had an early bloom this spring and most of us is now Quality conscious, so if we have any kind of a break in the weather this comin' season we'll really have a vastly improved crop of fruit to ship to market.

With the greatly increased production of citrus fruit in Florida and other states growing grapefruit and oranges, it's been necessary to develop some new outlets for our crops. Snively Citrus Concentrates, Inc., Winter Haven, is fully aware of this fact and they are doin' something about it. Just recently these folks put on the market a product they call NU-ZEST, that is a 100 per cent Florida grapefruit juice. This new drink is distributed through soft drink and other similar outlets and even though it has been on the market a short time it gives promise of becomin' one of the most popular drinks. We like it and judgin' from the empty bottles we see around the drink stands there must be a lot of others who find it a delicious drink.

Florida ain't alone in havin' troubles. California may be headin' for a 3-year drouth. It has one about every 25 years . . . the last one in 1922. Pastures are already reported as bein' burned and prematurely hot weather, followed by frosts, has hurt fruit and vegetable crops. And to top it all, prices are down. Citrus has dropped 35 per cent. Other tree crops is down 49 per cent and grapes has fell off 64 per cent.

The vegetable growers has had their troubles in recent months. They have had excessive rains, hurricanes, high winds and whatnot, but the last month has been fine growin' weather and produce of real quality is now moving to market.

Uncle Bill

GRASSHOPPER CONTROL IN CITRUS GROVES IN FLORIDA

(Continued from Page 14)

tions which did damage particularly in June and early July and again in September and October. Experiments concerning the use of benzene hexachloride, chlordane, thiophos 3422 and chlorinated camphene for grasshopper control are described. The effects of cultural practices and the possibilities of control by judicious cultivation and cover crop management is discussed. Recommendations for control are outlined.

Literature Cited

Hinman, E. J. and F. T. Cowan. New Insecticides in Grasshopper Control. USDA Bur. of Ent. and Pl. Quar., E-722. May 1947.

List, G. M. and J. L. Hoerner. Dust and Sprays for Grasshopper Control. J. Econ. Ent. 40:138. 1947.

Weinman, Carl J., G. C. Decker, and J. H. Bigger. Insecticidal Sprays and Dusts for the Control of Grasshoppers. J. Econ. Ent., 40 91-97. 1947.

TIMING OF OIL SPRAYS AS RELATED TO FRUIT QUALITY, SCALE CONTROL, COLORING AND TREE CONDITION

(Continued from Page 9)

to have the least effect on solids. Briefly, oil emulsion sprays have affected degreening less when applications were made before August 15, and where two oil emulsion sprays were applied, degreening was retarded more than where a single application was made. The degreening was delayed to a marked degree when the second application was made in August, September or October. During years when the minimum temperatures ranged between 45° and 55°F. during the nights in late October and November the effect of oil emulsion sprays on degreening was not so pronounced as in years when the minimum temperatures were 60° or above.

The Effect of Timing of the Oil Spray on Tree Condition

There has been less injury to trees from oil sprays when they were sprayed in June than when the application was made in August or later (Thompson (6). The amount of dead wood which developed after the February freeze in 1947 was much greater in plots sprayed in September or later than in plots sprayed earlier in the year (Thompson 1947 (6)). However, the most severe damage developed in plots which received a second oil in September, October or November following an application in June. The plots which were sprayed in April with a combination copper-oil emulsion and resprayed in June with an oil emulsion were not damaged any more than plots receiving a single oil emulsion spray in either June or July.

When all factors are considered the most desirable period for oil emulsion applications has been between June 15 to July 31. When two oil emulsions are necessary the first application can be applied as a copper-oil combination emulsion followed with a second oil emulsion spray between June 15 and July 15. If necessary to use two straight oil emulsion sprays the first should be applied early in June and followed by a second application six weeks later.

Literature Cited

1. Griffith, J. T. Effect of length of growing season and oil timing on scale control. Citrus Industry Vol. 29, No. 3. March 1948.
2. Thompson, W. L. and J. W. Sites. Relationship of solids and ratio to timing of oil sprays on citrus. Citrus Industry Vol. 26, No. 5. May 1945.
3. Thompson, W. L. Some possible reasons for the increase of purple scale infestations. Citrus Industry Vol. 19, No. 12, pp. 6 & 7. 1938.
4. Thompson, W. L. Effect of magnesium deficiency on infestations of purple scale on citrus. Jour. Economic Entomology, Vol. 35, pp. 351-354. 1942.
5. Thompson, W. L. Some problems of control of scale insects on citrus. Proc. Fla. State Hort. Soc. 55: 51-59. 1942.
6. Thompson, W. L. Factors related to the timing of oil sprays for scale control. Citrus Industry Vol. 28, No. 8, pp. 5-7. 1947.
7. Winston, J. R. Degreening of oranges affected by oil sprays. Proc. Fla. Start Hort. Soc. Vol. 55, pp. 42-45. 1942.
8. Yothers, N. N. and O. C. McBride. The effects of oil sprays on the maturity of citrus fruits. Proc. Fla. State Hort. Soc. 42: 193-218. 1929.

NEW INSECTICIDES AND THEIR APPLICATION ON CITRUS

(Continued from page 19)

were infested with young mites as compared to no mites where a more effective material was used. A month following the application there was no difference in the populations in the treated and untreated plots.

GREASY SPOTS ON CITRUS LEAVES

(Continued from page 22)

2. Rhoads, Arthur S. and E. F. DeBusk. Diseases of citrus in Florida. Fla. Agric. Exp. Sta. Bul. 229. pp. 172. 1931.

3. Stevens, H. E. Florida citrus diseases. Fla. Agric. Exp. Sta. Bul. 150, pp. 99. 1915.

4. Yothers. W. W. and Arthur C. Mason. The citrus rust mite and its control. U. S. D. A. Tech. Bul. 176, pp. 24. 1930.

Classified Ads

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